

WHAT IS CLAIMED IS:

1. A composition, comprising: at least one isolated nucleic acid molecule that encodes at least one polypeptide that catalyzes at least one step in the synthesis of at least one polyketide or bryopyran ring, wherein said at least one nucleic acid is derived from at least one marine organism.
2. The composition of claim 1, wherein said at least one bryopyran ring comprises at least one bryostatin.
3. The composition of claim 1, wherein said at least one polypeptide comprises at least one activity of at least one polyketide synthase.
4. The composition of claim 1, wherein said at least one marine organism comprises at least one bacteria.
5. The composition of claim 4, wherein said at least one bacteria comprises at least one *Candidatus*.
6. The composition of claim 5, wherein said at least one *Candidatus* comprises at least one *Endobugula*.
7. The composition of claim 6, wherein said at least one *Endobulgula* comprises at least one *Endobulgula sertula*.
8. The composition of claim 1, wherein said at least one marine organism comprises at least one invertebrate.
9. The composition of claim 8, wherein said at least one invertebrate comprises at least one *Bugula*.
10. The composition of claim 9, wherein said at least one *Bugula* is *Bugula neritina*.

11. The composition of claim 9, wherein said at least one *Bugula* is *Bugula pacifica*.

12. The composition of claim 1, wherein said at least one nucleic acid molecule further comprises at least one expression control sequence.

13. The composition of claim 1, wherein said nucleic acid molecule is in a vector.

14. The composition of claim 13, wherein said vector is within a cell.

15. The composition of claim 1, wherein said at least one nucleic acid molecule is within a cell.

16. A composition, comprising a library of nucleic acid molecules of claim 1.

17. A composition, comprising: at least one isolated polypeptide that catalyzes at least one step in the synthesis of at least one polyketide or bryopyran ring, wherein said at least one polypeptide is derived from at least one marine organism.

18. The composition of claim 17, wherein said at least one bryopyran ring comprises at least one bryostatin.

19. The composition of claim 17, wherein said at least one polypeptide comprises at least one activity of at least one polyketide synthase.

20. The composition of claim 17, wherein said at least one marine organism comprises at least one bacteria.

21. The composition of claim 20, wherein said at least one bacteria comprises at least one *Candidatus*.

22. The composition of claim 21, wherein said at least *Candidatus* comprises at least one *Endobugula*.

23. The composition of claim 22, wherein said at least one *Endobulgula*
5 comprises at least one *Endobulgula sertula*.

24. The composition of claim 17, wherein said at least one marine organism comprises at least one invertebrate.

10 25. The composition of claim 24, wherein said at least one invertebrate comprises at least one *Bugula*.

26. The composition of claim 25, wherein said at least one *Bugula* is *Bugula neritina*.

15 27. The composition of claim 25, wherein said at least one *Bugula* is *Bugula pacifica*.

28. The composition of claim 17, wherein said at least one polypeptide is
20 within a cell.

29. A composition, comprising a library of polypeptides of claim 17.

30. A method of making a polyketide or bryopyran ring containing
25 composition, comprising: providing the composition of claim 1, and synthesizing a composition therefrom which comprises at least one polyketide or bryopyran ring.

31. The method of claim 30, wherein said at least one bryopyran ring
30 comprises at least one bryostatin.

32. A composition made by the method of claim 30.

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33. The composition of claim 32, wherein said composition does not comprise a known bryostatin.

34. The composition of claim 30, comprising at least one pharmaceutically acceptable carrier.

35. The composition of claim 30, wherein said composition is a pharmaceutical composition.

36. A method of making a polyketide or bryopyran ring containing composition, comprising: providing the composition of claim 17, and synthesizing a composition therefrom which comprises at least one polyketide or bryopyran ring.

37. A composition made by the method of claim 36.

38. The composition of claim 37, wherein said composition does not comprise a known bryostatin.

39. The composition of claim 37, comprising at least one pharmaceutically acceptable carrier.

40. The composition of claim 37, wherein said composition is a pharmaceutical composition.

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41. A method for identifying at least one nucleic acid molecule encoding at least one activity of a PKS, comprising: contacting a nucleic acid molecule of claim 1 with a sample, and identifying nucleic acid molecules in said sample that hybridize with said nucleic acid molecule of claim 1.

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42. The method of claim 41, wherein said sample is derived at least in part from an environmental sample.

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43. The method of claim 42, wherein said environmental sample is derived at least in part from a marine environment.

44. A nucleic acid molecule identified by the method of claim 41.

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45. The nucleic acid molecule of claim 44, comprising an expression control sequence.

46. The nucleic acid molecule of claim 44 in a vector.

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47. The nucleic acid molecule of claim 44 in a cell.

48. A composition comprising a library of nucleic acid molecules of claim 44.

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49. A method for identifying a bioactive compound, comprising: contacting the composition of claim 32 with an *in vitro*, *ex vivo* or *in vivo* detection system and determining the bioactivity of said compound.

20 50. A bioactive compound identified by the method of claim 49.

51. The bioactive compound of claim 50 in a pharmaceutically acceptable carrier.

25 52. The bioactive compound of claim 50, wherein said bioactive compound is a pharmaceutical compound.

53. A method for identifying a bioactive compound, comprising: contacting the composition of claim 37 and determining the bioactivity of said compound.

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54. A bioactive compound identified by the method of claim 53.

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55. The bioactive compound of claim 54 in a pharmaceutically acceptable carrier.

56. The bioactive compound of claim 54, wherein said bioactive compound
5 is a pharmaceutical compound.

57. An isolated bacterial symbiont of *Bugula*, wherein said bacterial symbiont comprises at least one polypeptide that has at least one PKS activity.

10 58. An isolated bacterial symbiont of *B. neritina* or *B. pacifica*, wherein said bacterial symbiont comprises at least one polypeptide that has at least one PKS activity.

59. A composition comprising at least one polyketide, bryopyran ring or
15 bryostatin present in *Bugula pacifica*.

60. The composition of claim 59, wherein said composition has at least one activity of at least one bryostatin.

20 61. The composition of claim 59, wherein said composition is isolated from *Bugula pacifica*.

62. The composition of claim 1 which hybridizes under moderate hybridization conditions to any one of SEQ ID NOS. 9, 11, 13, 15, 17, 19, 21,
25 23, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, or the complement thereof.

63. The composition of claim 1 which hybridizes under stringent hybridization conditions to any one of SEQ ID NOS. 9, 11, 13, 15, 17, 19, 21,
23, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, or the complement thereof.

30 64. An isolated nucleic acid molecule comprising any one of SEQ ID NOS. 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, or the complement thereof.

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65. An isolated nucleic acid molecule encoding SEQ ID NOS. 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, or 38.

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